

## CLAIMS

What is claimed is:

1. A code division multiple access user equipment for use in receiving a plurality of data signals received over a shared spectrum, each received data signal experiencing a similar channel response, the user equipment comprising:

means for receiving a combined signal of the received data signals over the shared spectrum;

means for sampling the combined signal at a multiple of a chip rate of the received data signals;

means for estimating a channel response for the combined signal at the multiple of the chip rate;

means for determining a first element of a spread data vector using the combined signal samples and the estimated channel response;

means for using a factor from the first element determination to determine remaining elements of the spread data vector; and

means for estimating data of the data signals using the determined elements of the spread data vector.

2. The user equipment of claim 1 wherein the factor is derived using the channel response.

3. The user equipment of claim 1 wherein the multiple of the chip rate is N-multiple of the chip rate and the factor is  $v^H$  and a first element of each channel response matrix corresponding to each N-multiple of the chip rate is  $h_1(0), h_2(0) \dots h_N(0)$  and

$$v^H = \left\{ \begin{bmatrix} h_1(0) & \dots & h_N(0) \end{bmatrix} \begin{bmatrix} h_1(0) \\ \vdots \\ h_N(0) \end{bmatrix} \right\}^{-1} [h_1(0) \dots h_N(0)].$$

4. The user equipment of claim 3 wherein N is 2 and

$$v^H = \left\{ \begin{bmatrix} h_1(0)h_2(0) \begin{bmatrix} h_1(0) \\ h_2(0) \end{bmatrix} \end{bmatrix}^{-1} [h_1(0)h_2(0)]. \right.$$

5. The user equipment of claim 1 wherein the data estimating is by despreading the spread data vector.

6. The user equipment of claim 1 wherein the factor is stored prior to the remaining elements determination.

7. A code division multiple access user equipment for use in receiving a plurality of data signals received over a shared spectrum, each received data signal experiencing a similar channel response, the receiver comprising:

an antenna for receiving a combined signal of the received data signals over the shared spectrum;

a sampling device for sampling the combined signal at a multiple of a chip rate of the received data signals;

a channel estimation device for estimating a channel response for the combined signal at the multiple of the chip rate; and

a single user detection device for determining a first element of a spread data vector using the combined signal samples and the estimated channel response and for using a factor from the first element determination to determine remaining elements of the spread data

vector;

wherein data of the data signals is estimated from the spread data vector.

8. The user equipment of claim 7 wherein the factor is derived using the channel response.

9. The user equipment of claim 7 wherein the multiple of the chip rate is N-multiple of the chip rate and the factor is  $v^H$  and a first element of each channel response matrix corresponding to each N-multiple of the chip rate is  $h_1(0), h_2(0) \dots h_N(0)$  and

$$v^H = \left\{ \begin{bmatrix} h_1(0) & \dots & h_N(0) \end{bmatrix} \begin{bmatrix} h_1(0) \\ \vdots \\ h_N(0) \end{bmatrix} \right\}^{-1} \begin{bmatrix} h_1(0) & \dots & h_N(0) \end{bmatrix}.$$

10. The user equipment of claim 9 wherein N is 2 and

$$v^H = \left\{ \begin{bmatrix} h_1(0) & h_2(0) \\ h_2(0) & h_1(0) \end{bmatrix} \right\}^{-1} \begin{bmatrix} h_1(0) & h_2(0) \end{bmatrix}.$$

11. The user equipment of claim 7 wherein the data estimating is by despreading the spread data vector.

12. The user equipment of claim 7 wherein the factor is stored prior to the remaining elements determination.